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ABSTRACT

This study attempted to develop a diagnostic-prescriptive curriculum program to improve the school readiness of disadvantaged preschoolers. The language development patterns of 32 3-, 4-, and 5-year-olds were diagnosed by use of the Illinois Test of Psycholinguistic Abilities (ITPA). Teachers were trained to use this information to provide an instructional program based on a curriculum developed around the subtests of the ITPA. Stratified sampling based on intelligence test scores was used to assign 16 subjects to the experimental and 16 to the control group. Both groups were pre- and posttested on the Caldwell Preschool Inventory (CPI). The ITPA was used to test the language abilities of the experimental subjects who for four months received a special hour-a-day lesson based on individual language needs. Teachers were free to adjust or alter lesson plans. Posttest CPI scores indicated that the diagnostic-prescriptive program significantly improved the school readiness of the experimental subjects. Appendixes A and B list classroom deficiencies and language activities related to ITPA subtests. (MH)

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A DIAGNOSTIC-PRESCRIPTIVE APPROACH TO PRESCHOOL EDUCATION[1]

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Available diagnostic instruments such as the Frostig Developmental Tests of Visual Perception (Frostig, 1963), the Illinois Test of Psycholinguistic Abilities (McCarthy and Kirk, 1963), and the Auditory Discrimination Test (Wepman, 1958) have stimulated research studies on diagnostically-based curriculum programs for children with learning disorders at the pre-school level.

Results of numerous investigations appear to indicate that the most effective pre-school programs are those with the most specific and structured cognitive activities (DiLorenzo and Salter, 1968). These structured programs have been shown to improve the language abilities of pre-schoolers (Spicker et al., 1966; Karnes et al., 1968) and increase their intellectual functioning (Karnes and Hodgins, 1969).

Oakland (1969) discussed some limitations in using these diagnostic-prescriptive instruments. They tend to emphasize the child's weaknesses while neglecting his strengths. This preoccupation with deficiencies often interferes with prompt and effective remediation. Secondly, teachers often cannot translate the psychometrist's data and psychological terminology into a specific remedial plan tailored to meet the child's strengths and weaknesses. Regarding the latter concern, Oakland recommended that inservice programs be initiated to increase teachers' sophistication both in measurement and evaluation, so they may play a greater role in translating diagnostic data into effective remedial programs.

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[1] This paper was presented at the 1970 annual meeting of the American Educational Research Association, Minneapolis, Minnesota.

The objectives of the present investigation were consistent with Oakland's recommendations, in that we diagnosed the language developmental patterns of pre-school children on the ITPA and trained teachers to use this information to provide an instructional program based on curriculum developed around the subtests of the ITPA. It was believed that these activities could enhance the language and cognitive skills of these children and perhaps more adequately prepare them to function in kindergarten and first grade settings.

The purpose of the study was to determine whether this diagnostic-prescriptive program would improve the school readiness of disadvantage pre-schoolers as determined by test scores on the Caldwell Preschool Inventory.

METHOD

The subjects were 32 three-four-, and five-year old disadvantaged children selected from a state funded pre-school administered by the University of Southern California with a total enrollment of 50 students. Students with poor attendance records, severe emotional problems, or inability to speak English were excluded from the investigation.

Since the students at the pre-school were already divided into three age groups for instruction with two teachers in each group Ss for the experimental and control groups were selected from each of the these intact groups. In addition, one teacher from each of the three groups was randomly selected to work with the experimental Ss.

All Ss were administered the Peabody Picture Vocabulary Test. A stratified sampling of intellegience test scores was used to assign the students to treatment groups, resulting in 16 Ss in the control and 16 Ss in the experimental groups. The I.Q. means for each group are presented in Table 1.

Insert table 1 about here

The Ss were also pre- and post- tested on the Caldwell Preschool Inventory. In addition, the ITPA was used to assess the language abilities of the 16 Ss in the experimental group. The resulting profiles and lesson assignments developed from the subtests (see appendix B) were made available to the experimental teachers. The classroom behaviors listed in appendix A were used to provide instruction regarding the meaning of the subtests.

All Ss attended the pre-school for one-half day periods and participated in the traditional learning activities of the school. However, one-hour each day for four months, the three subgroups comprising the experimental Ss received special instruction related to strengths and weaknesses indicated by their ITPA profiles.

Each day before instruction the teachers studied the profiles to decide which tasks they would introduce during the allotted sixty minutes. For example, if a teacher decided to work on motor encoding skills (expressing ideas motorically), she would turn to the motor encoding section of her curriculum guide and select the appropriate exercise. One such exercise was as follows:

Purpose : to demonstrate the use of objects
Materials: picture of objects or real objects; ex. telephone, glass, cup, saw, hammer etc.
Suggested procedures:

1. children are in a discussion situation.
2. picture of an object is displayed.
3. teacher asks a child to name the object.
4. teacher asks a child to show how the object is used.
5. continue in same manner with picture of objects or real objects.

This study also enabled them to a) note each child's deficits, b) decide on the level of complexity in which the tasks would be presented, and c) evaluate student progress for future planning. The teachers were free to alter predetermined plans according to the progress, tolerance, and interest of the individuals in her group.

The sixty minutes of instruction were divided into thirty minutes which were alternated with activities that acquired combined participation by both the control and experimental groups. Consequently, other than the alloted sixty minutes each morning, all the Ss received the same instruction. During the time the experimental Ss received this special instruction , the control group received equal attention in miscellaneous learning activities.

Results and Discussion

As shown in Table 2, analysis of covariance using the pre- and post-test scores on the Caldwell Preschool Inventory indicated that the diagnostic-prescriptive program significantly improved the school readiness scores of the experimental Ss ($F=6.84$; $p < .05$).

Insert tables 2 and 3 about here

Although I.Q. data were used to equate groups, a discrepancy appeared in the pre-test scores on the dependent measure, as shown in Table 3. The control group ($\bar{x}=40.6$) scored 9.1 points higher than the experimental group ($\bar{x}=31.5$). Closer analysis of that data indicated that this discrepancy was caused by the differences in pre-test scores among the five-year-old subjects. The five-year-olds in the experimental group (N=6) mean score was 34, while the control group (N=8) mean score

was 53. The I.Q. means (PPVT) for this same age group were 84 and 88 respectively.

Rosenthal's (1968) findings immediately come to mind (as well as Thorndike's (1969) criticism of his methodology)regarding this situation, since some of Rosenthal's experimented Ss also scored much lower on the pre-test than his control group Ss, but ended up significantly higher on the post-test. Moreover, since all six teachers worked closely with each other and were acquainted with the experimental Ss, an explanation of the results via teacher expectancy cannot be completely ruled out. This explanation would be especially true if the teachers provided the experimental Ss with more practice time and attention during the remaining part of the morning. In future studies, Good's (1970) observation schedule, used to evaluate a teacher's interaction with individual students rather than her interaction with the total class, could provide some evidence for this occurrence, if indeed this were true.

The continued success of investigations using highly structured programs at the pre-school level suggest that curricula should be developed from many diagnostic instruments in both the cognitive and social areas. In the present study, we found that after brief exposure to the ITPA and the curriculum materials developed from its subtest, teachers were able to make intelligent descisions concerning its use. There is reason to believe that if similar material were made available for the teacher, it too could be effectively used in instruction.

The ITPA was chosen in this study because it has proved to be particularly useful in program development. Our prescribed curriculum was not meant to be innovative in relation to current pre-school activities. However, it was an attempt to organize activities under a classification system so that a teacher would have a better idea as to the type of activity

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necessary for certain remedial attempts. Using the subtests of the ITPA, a teacher can effectively classify her present classroom activities. She may find that she emphasizes certain types of activities while neglecting others which are essential for language and cognitive development. Improvements in instruction can often be accomplished without adding new activities, but making better use of the activities currently employed.

When working with pre-school children, the problem of obtaining and sustaining attention for even short periods of time is often difficult. Our teachers commented that by selecting tasks pertaining to children's strengths, they were able to motivate them for individual and group activities. Their success in such activities enabled the teacher subsequently to introduce activities in areas in which they showed some deficiencies while still maintaining attention.

We have seen a significant trend in recent years on the role of the teacher in intervention programs. As curriculum changes more rapidly, these innovations will make even greater demands on teachers, requiring them to alter teaching strategies (Sigel, 1969) and become even more skilled diagnosticians and problem-solvers. Greater attempts must be made to provide teachers with more detailed guidelines in the implementation of curriculum and remedial programs.

Lastly, in order to sustain a diagnostic-prescriptive program in the primary grades, where it is often impossible to obtain small pupil-teacher ratios, we have embarked on a program using Durrell's (1964) concept of team-learning. In such situations, groups of two or three students work independently on a remedial program without direct supervision from the teacher. This is accomplished by aiding the teacher to develop "learning centers" in her room which comprise various language activities. These

learning centers are grouped around ITPA subtests or some other similar classification system. Each child has a specific program of activities which he is to complete independently or with a team member who has strength in his area of deficiency. All students are able to move about the room freely, going to their prescribed learning center to complete their activity for the day. Thus, it may be possible to train teams of students to remediate many of their own language deficiencies.

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Table 1

I.Q. MEANS AND STANDARD DEVIATIONS ON THE PEABODY PICTURE VOCABULARY TEST

Group	Means	S.D.
Control	81.8	15.7
Experimental	84.9	16.2

Table 2

SUMMARY OF ANALYSIS OF COVARIANCE FOR CALDWELL PRESCHOOL INVENTORY

Source of Variation	df	sum of squares	mean squares	F
Between	1	848.46		
Within	29	3,547.52	848.46	6.94*
Total	30	4,395.98	122.32	

P < .05

Table 3

MEANS ON CALDWELL PRESCHOOL INVENTORY

Group	Initial Means (Covariate)	Unadjusted Means (Criterion)	Adjusted means
Experimental	31.5	55.43	58.79
Control	40.6	51.37	48.01

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APPENDIX A

Observable Classroom Deficiencies Related to the Subtests of the ITPA

Psycholinguistic Skills	Observable Behavior
1. <u>Auditory Decoding</u>: The ability of the child to understand what is heard.	a. Cannot follow oral directions or instructions b. Cannot listen attentively or short attention span c. Cannot recognize simple vocabulary when heard d. Cannot answer simple questions e. Cannot repeat words stated by teacher f. Cannot associate sounds with letters g. Cannot sit still, restless
2. <u>Visual Decoding</u>: The ability of the child to understand what is seen	a. Cannot discriminate between two objects which differ in size or color or shape b. Cannot concentrate attention on an object c. Cannot identify colors, or letters d. Cannot recognize what is missing in a picture, e.g. (table with one leg missing) e. Cannot color within lines of a circle or square f. Cannot enjoy pictures or books g. Cannot understand what he reads h. Cannot describe what is happening in a picture
3. <u>Auditory-Vocal Association</u>: The ability of the child to draw relationships between ideas that are presented orally.	a. Cannot underatand polar opposites of "big" and "little", "hot" and "cold", etc. b. Cannot understand the concept faster, e.g., "Which is faster, a car or bicycle?" c. Cannot classify objects in terms of functions, e.g., (glass, pillow, etc.) d. Cannot deal with the logical relationship between "some" and "all" e. Cannot understand size, weight relationships, e.g., Are big dolls heavier than little dolls?, or "Is a book heavier than a crayon?" f. Cannot ask a clear, direct question g. Cannot understand the concepts between, in front of, above, in, on top of, above, etc.

4. **Visual-Motor Association:** The ability to draw relationships between ideas that are presented visually

a. Cannot categorize pictures
b. Cannot classify objects according to size, shape, color or texture.
c. Cannot classify objects according to use or functions
d. Cannot select different community helpers to place on bulletin board
e. Cannot classify pets and Zoo animals
f. Cannot take initiative to manipulate objects to gain information, or being curious.

5. **Vocal Encoding:** The ability to express ideas verbally.

a. cannot express himself, seldom talks, or is shy
b. Cannot give more than one word answers.
c. Cannot express many ideas, but talks a lot.
d. Cannot sing with group or alone
e. Cannot name body parts e.g., shoulder elbow,
f. Cannot show-and-tell

6. **Motor Encoding:** The ability to express ideas through movement, gestures or actions.

a. Cannot cut with scissors
b. Cannot hold pencil correctly
c. Cannot draw well
d. Cannot stack blocks
e. Cannot play with clay
f. Cannot finger paint
g. Cannot write well (manuscript or cursive, as age allows)
h. Cannot tie, button, or zip.

7. **Auditory-Vocal Automatic:** The ability to express oneself in a grammatically correct manner.

a. Cannot articulate well, or express oneself clearly
b. Cannot use possessive pronouns
c. Cannot form plurals of nouns, or use past tense of verbs
d. Cannot use single words, phrases, or sentences.

8. **Visual-Motor Sequential:** The ability to sequence things that have been seen.

a. Cannot place in sequence pictures of a simple story recently told.
b. Cannot follow number or letter dot patterns.
c. Cannot put a gigsaw puzzle together
d. Cannot copy from memory a circle, square or triangle.
e. Cannot place numbers or letters in sequential order
f. Cannot detect the first, second, middle or last position among three or more objects.

9. <u>Auditory-Vocal Sequential</u>: The ability to sequence things that have been heard.

a. Cannot count to five, ten or more
b. Cannot tell the names of siblings from memory
c. Cannot tell last name from memory
d. Cannot relate how many wheels are on a car, bicycle, tricycle from memory.
e. Cannot tell about what has been recently experienced
f. Cannot learn rote-memory tasks, such as alphabet, number combinations
g. Cannot say telephone number or address
h. Cannot relate sequentially or simple story

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APPENDIX B

The categorization of the different language activities related to each subtest of the Illinois Test of Psycholinguistic Abilities, taken in part from Hayes (1967), are listed as follows:

1. Auditory Decoding: The ability of the child to understand or interpret what he hears.

   a. Practice in carrying out a series of directions, gradually increasing complexity as memory will allow.
   b. Practice in listening to stories, rhymes, various sounds, records.
   c. Practice in identifying an object or an action that the teacher describes.
   d. Practice in distinguishing sounds of letters and words
   e. Practice in answering simple questions--child learns to respond quickly to exercise (requires concentration) e.g., "Do you eat?", "Does a ball run?", "Can you run?"

2. Visual Decoding: The ability to comprehend visual stimuli.

   a. Practice in observing details in pictures, completing what's missing.
   b. Practice in sorting tasks (objects, pictures, symbols)
   c. Practice in identifying colors, letters, words, numbers, geometric forms, etc.
   d. Practice in matching and measuring, and ordering (graduations)
   e. Practice in distinguishing similarities and differences in sizes, shapes, lengths, forms, colors, texture.
   f. Practice in recognizing numbers, words, and symbols when rearranged.
   g. The idea of inclusion, the part being contained in the whole, e.g., two black and 10 white buttons, and asked "Are there more buttons than white buttons?"
   h. Practice in labeling objects.
   i. Practice in reading experience charts.

3. Auditory-Vocal Association: The ability to draw relationships between ideas presented orally.

   a. Practice in answering thought questions, e.g., "What can you do with a ball?", "How many wheels does a car have?"
   b. Practice in problem solving, e.g., "If you couldn't find a toy in your toy box, how would you go about finding it?", If your friend fell, what would you do?"
   c. Practice in answering or telling how two or more things are alike. "How are an apple and orange alike?"
   d. Practice in knowing the difference between all, some, few, on, over, under, in, between, above, e.g., "Put the doll in the box." "Stand between Mary and John." Which is bigger, the book or pencil?"
   e. Practice in answering cause and effect questions, e.g., "What would happen if a dog and cat were put into a room together?"
   f. Practice in oral number problems, e.g., Take away all except two.

4. Visual-Motor Association: The ability to draw relationships between ideas that are presented visually.

   a. Practice in classifying pictures, objects, in specific categories, relative to functional, nominal attributes. (functional, how they can be used; nominal, whether they are animals, people, toys, furniture, etc.)
   b. Practice in finding pictures of opposites, sad, happy, round, square
   c. Practice in finding which does not belong out of a group of pictures or objects.
   d. Practice in identifying community helpers, members of a family.

5. Vocal Encoding: The ability to express ideas verbally.

   a. Practice in describing objects, toys, what's happening in a picture
   b. Practice in talking about what has been experienced.
   c. Practice in telling what community helpers do, and family members do.
   d. Practice in social communication
   e. Practice in retelling short stories.

6. Motor Encoding: The ability to express ideas through movement, gestures or actions.

   a. Practice in imitating body movements of teacher, animals, etc.
   b. Practice in manipulating and exploring use of objects, toys, and play equipment.
   c. Practice in making clay figures.
   d. Practice in showing how to use objects.
   e. Practice in showing the way things move, e.g., clock, swing, etc.
   f. Practice in role playing.

7. Auditory-Vocal Automatic: ~~- The ability to express oneself in a grammatically~~ correct manner.

   a. Practice in using adjectives or descriptive words.
   b. Practice in using action words, e.g., hop, skip, run, walk, etc.
   c. Practice in completing sentences, e.g., Using pictures and state, "Here is a girl, here are <u>two</u> girls." "Mary is <u>walking</u> . John is <u>running</u> ."
   d. Practice in using words or opposite meanings, with pictures, e.g., hot (fire), cold (ice cream), red (light), green (light).
   e. Practice in social use of language, e.g.,"Good morning" "Thank you", "Please."
   f. Practice in functional use of language. Have children ask the other children to give, or do something.
   g. Practice in self-use of language, e.g., expressing how one feels, or what one needs, etc.
   h. Practice in expressing degrees in comparison. Using pictures or objects, state. "This box is big, this box is <u>bigger</u> ."
   i. Defining words, e.g., "What is an orange, car, ball, etc.

8. Visual-Motor Sequencing: The ability to sequence things that have been seen.

   a. Practice using puzzle sequences e.g., putting a human form together, a ball, a wagon (two-part puzzle), etc.
   b. Practice in putting a series of pictures in sequence relating to a short story or nursery rhyme.
   c. Practice in assembling objects, toys, etc.
   d. Practice in finding directions in simple maze patterns
   e. Practice in sequentially ordering numbers and letters of the alphabet in game form.
   f. Practice in finding games--locating what is missing in an array.
   g. Practice recalling correct sequence of items, before placed under cup, etc.
   h. Practice in using forms child can put in order of size--big, smaller, smallest.

9. Auditory-Vocal Sequencing: The ability to sequence things that have been heard.

   a. Practice in puppet dialogue.
   b. Practice in repeating short sentences.
   c. Practice in singing songs
   d. Practice in repeating nursery rhymes
   e. Practice in answering questions relating to, which comes first, second.

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